Published online September 8, 2006

Registration of Soybean Germplasm Line DT97–4290 with Moderate Resistance to Charcoal Rot

DT97–4290 soybean [*Glycine max* (L.) Merr.] (Reg. no. GP-320, PI 642055) was developed as a maturity group IV germplasm line by the USDA-ARS, Stoneville, MS. It was released in December 2004 because of its high yield potential and moderate resistance to charcoal rot [caused by *Macrophomina phaseolina* (Tassi) Goid.] and resistance to southern stem canker [caused by *Diaporthe phaseolorum* (Cooke & Ellis) Sacc. var. *meridionalis* F.A. Fernandez].

DT97–4290 originated as an F_5 single-plant selection from the cross Asgrow 'A5979' × Delta Pine 'DP3478'. A5979 was selected from the cross 'Young' × 'A5474' (Burton et al., 1987; Shannon and Schillinger, 1989). The F_1 to F_6 generations were all grown at Stoneville, MS. The F_1 generation was grown in the greenhouse in 1994. The F_2, grown in the field in 1995, and the F_3 and F_4, grown in the greenhouse in 1995 and 1996, were advanced by the single-pod method, which is similar to the single-seed descent method (Brim, 1966) except that a single pod, rather than a single seed per plant, was advanced with each generation of inbreeding. The F_5 generation was grown in the field in 1996, and single-plant selections were harvested. F_6 plant rows were grown in the field in 1997, and row DT97–4290 was harvested in bulk for further evaluation. DT97–4290 was tested in Mississippi by the USDA-ARS for disease resistance and other agronomic traits from 1998 to 2003. It was also evaluated in the USDA Uniform Soybean Tests, Southern States (Preliminary Group IV-S) in 2001 (Paris, 2001) and (Uniform Group IV-S) in 2002 and 2003 (Paris, 2002, 2003), and in the Mississippi State University soybean variety trials during 2001, 2003, and 2004 (White et al., 2002, 2004, 2005).

DT97–4290 has an indeterminate growth habit, purple flowers, tawny pubescence, and tan pod walls. Seed are shiny yellow with black hila. DT97–4290 is classified as Maturity Group IV (relative maturity 4.8), and matures about 2 d earlier than 'Manokin' (Kenworthy et al., 1996). In 3 yr of USDA Uniform tests, plant height of DT97–4290 averaged 91 cm compared to 75 cm for that of Manokin. The plant lodging score of 2.0 (where 1 = all plants upright and 5 = all plants prostrate) and seed quality score of 2.2 (where 1 = excellent and 5 = poor) of DT97–4290 were similar to those of Manokin. Seed weight of DT97–4290 averaged 144 mg seed^{-1} compared with 122 mg seed^{-1} for Manokin. Seed of DT97–4290 averaged 415 g kg^{-1} protein (zero moisture basis) and 197 g kg^{-1} oil (zero moisture basis), which is 11 g kg^{-1} more protein and 9 g kg^{-1} less oil than that of Manokin. In 38 southern environments, seed yield of DT97–4290 averaged 3176 kg ha^{-1}, which is 2% greater than that of Manokin. In 15 environments, five locations during 3 yr, in the Mississippi State University soybean variety trials, DT97–4290 averaged 3169 kg ha^{-1}, which was 208 kg ha^{-1} less than check cultivar DP4748S (White et al., 2002, 2004, 2005).

DT97–4290 is moderately resistant to charcoal rot based on field evaluations from 2002 to 2004 in artificially infested sandy loam soil at Stoneville, MS. Host tissue colonization by *M. phaseolina* was assessed in three replications by destructively sampling 10 plants at the R7 growth stage (Mengistu and Paris, 2003). The severity of internal discoloration for stem and root was measured on a scale of 1 to 5 (where 1 = resistant, >1 to 2 = moderately resistant, >2 to <3 = moderately susceptible, and 3–5 = susceptible). Colony forming units (Smith and Carvil, 1997) of *M. phaseolina* were also used as a measure of resistance. The number of colony forming units, 1 to 5000, 5001 to 7000, and >7000, contained in 1 g of ground tissue correspond to severity values of >1 to 2, >2 to <3, and 3 to 5, respectively. Over the 3-yr study, DT97–4290 averaged 4388 colony forming units (severity value of 1.6), whereas susceptible check Manokin averaged 8331 colony forming units (severity value of 3.6). This assessment method was developed by Mengistu and Paris (2003) to evaluate large numbers of germplasm lines. DT97–4290 is the first soybean germplasm line to be released specifically for its resistance to charcoal rot. It is a valuable source of resistance for soybean breeders and producers in areas experiencing yield losses due to charcoal rot.

DT97–4290 is resistant to southern stem canker (similar to resistant check cultivar Manokin), *Soybean mosaic virus* (Paris, 2003), and Races 2, 4, and 10 of Phytophthora rot [caused by *Phytophthora sojae* (M.J. Kaufmann and J.W. Gerdemann)] (White et al., 2002). DT97–4290 is also moderately resistant to frogeye leaf spot (caused by *Cercospora sojina* Hara) (Paris, 2003).

Breeder seed will be maintained by the USDA-ARS, Crop Genetics and Production Research Unit, P.O. Box 345 Stoneville, MS 38776–0345. One hundred seed of DT97–4290 can be obtained for research purposes from the corresponding author for at least 5 yr. Seed of this release is deposited in the National Plant Germplasm System where it will be available after 5 yr. for research purposes, including development and commercialization of new cultivars. It is requested that appropriate recognition be made if this germplasm line contributes to the development of new germplasm or cultivars.

R.L. Paris, A. Mengistu, J.M. Tyler, and J.R. Smith*

References

Brim, C.A. 1966. A modified pedigree method of selection in soybeans. Crop Sci. 6:220.

Burton, J.W., C.A. Brim, and M.F. Young. 1987. Registration of 'Young' Soybean. Crop Sci. 27:1093.

Kenworthy, W.J., J.G. Kantzes, L.R. Krusberg, and S. Sardanelli. 1996. Registration of 'Manokin' Soybean. Crop Sci. 36:1079.

Mengistu, A., and R.L. Paris. 2003. Comparison of disease assessments of soybean genotypes in the presence of charcoal rot. Phytopathology 93:S61.

Paris, R.L. (ed.). 2001. The uniform soybean tests, southern states. USDA-ARS, Stoneville, MS.

Paris, R.L. (ed.). 2002. The uniform soybean tests, southern states. USDA-ARS, Stoneville, MS.

Paris, R.L. (ed.). 2003. The uniform soybean tests, southern states. USDA-ARS, Stoneville, MS.

Shannon, J.G., and J.A. Schillinger. 1989. Registration of 'A5474' soybean. Crop Sci. 29:1091.

Smith, G.S., and O.N. Carvil. 1997. Field screening of commercial and experimental soybean cultivars for their reaction to *Macrophomina phaseolina*. Plant Dis. 81:363–368.

White, B.W., A. Blaine, J. Howell, W. Maily, R. Martin, A. Smith, C.E. Watson, M. Young, and L. Zhang. 2002. Mississippi soybean variety trials, 2001. Mississippi Agric. and For. Exp. Stn. Info. Bul. 384. Mississippi State, MS.

White, B.W., A. Blaine, R. Martin, D. Poston, T. Rector, A. Smith, C.E. Watson, M. Young, and L. Zhang. 2004. Mississippi soybean variety trials, 2003. Mississippi Agric. and For. Exp. Stn. Info. Bul. 404. Mississippi State, MS.

White, B.W., A. Blaine, B. Burgess, R. Martin, D. Poston, T. Rector, A. Smith, C.E. Watson, M. Young, and L. Zhang. 2005. Mississippi soybean variety trials, 2004. Mississippi Agric. and For. Exp. Stn. Info. Bul. 418. Mississippi State, MS.

R.L. Paris, The American Chestnut Foundation, 14005 Glenbrook Ave., Meadowview, VA 24361; A. Mengistu, USDA-ARS, 605 Airways Blvd., Jackson, TN 38301; J.R. Smith, USDA-ARS, P.O. Box 345, Stoneville, MS 38776-0345; J.M. Tyler, Delta and Pine Land Co., P.O. Box 157, Scott, MS 38772. Registration by CSSA. Received 2 Sept. 2005. *Corresponding author (rsmith@msa-stoneville.ars.usda.gov).

doi:10.2135/cropsci2005.09.0297
Published in Crop Sci. 46:2324–2325 (2006).